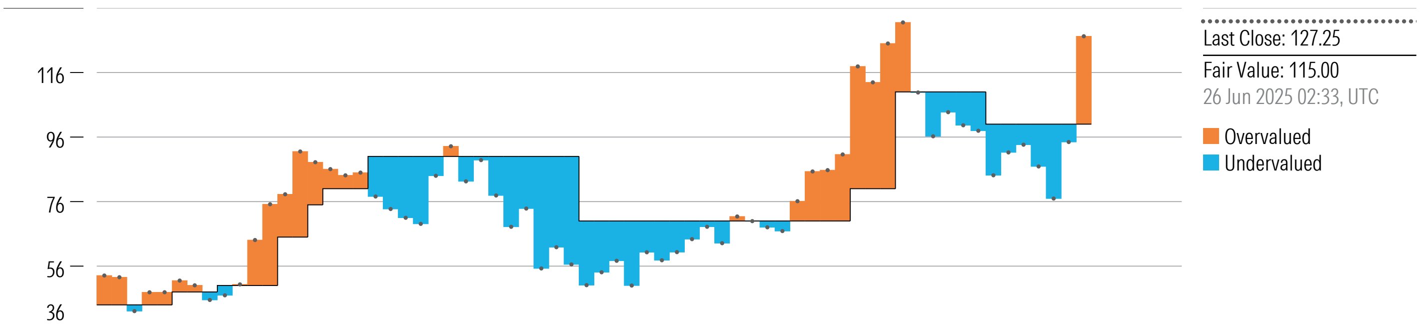
Morningstar Equity Analyst Report | Report as of 26 Jun 2025 02:40, UTC | Reporting Currency: USD | Trading Currency: USD | Exchange: NASDAQ - ALL MARKETS Page 1 of 22

Micron Technology Inc MU ★★★ 26 Jun 2025 02:34, UTC

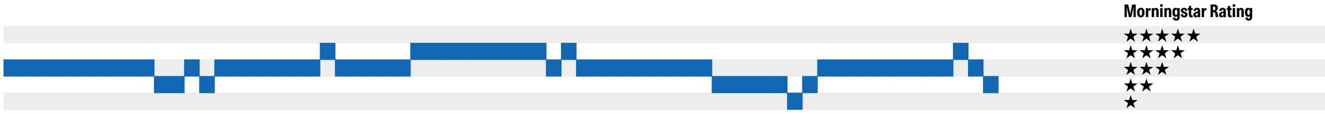
Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Equity Style Box	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
127.25 USD 25 Jun 2025	115.00 USD 26 Jun 2025 02:33, UTC	1.11	142.21 USD Bil 25 Jun 2025	None	Large Value	High	Standard	4 Jun 2025 05:00, UTC

Price vs. Fair Value



	2020	2021	2022	2023	2024	YTD	
	1.50	1.04	0.71	1.22	0.84	1.11	Price/Fair Value
	39.79	24.17	-45.87	71.67	-0.84	51.34	Total Return %

Morningstar Rating



Total Return % as of 25 Jun 2025. Last Close as of 25 Jun 2025. Fair Value as of 26 Jun 2025 02:33, UTC.

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The primary analyst covering this company does not own its stock.

[1]The ESG Risk Rating Assessment is a representation of Sustainalytics' ESG Risk Rating.

Micron Earnings: HBM Highlights a Blowout Quarter as We Raise Our Valuation to $115

Analyst Note William Kerwin, CFA, Senior Equity Analyst, 26 Jun 2025

Micron Technology's May-quarter results handily beat management guidance for growth and profitability. Revenue rose 37% year over year to $9.3 billion, inclusive of 50% sequential growth for high-bandwidth memory. August-quarter guidance implies continuing strong growth.

Why it matters: Micron's impressive results and guidance came well above our model. Artificial intelligence is benefitting Micron on multiple fronts, with strong demand from AI chipmakers for its HBM and rising DRAM content in smartphones and PCs. Strong demand is keeping pricing robust, too.

- HBM revenue rose by more than 50% sequentially for the second straight quarter, and we estimate nearly $2 billion in HBM revenue in the quarter (implying 20% of total firm revenue). We believe Micron is on track for its goal of 20% HBM market share exiting fiscal 2025.
- HBM offers higher pricing and better profitability than Micron's traditional DRAM, so we see strong AI demand boosting both growth and profitability over the medium term.

The bottom line: We raise our fair value estimate for no-moat Micron to $115, from $100, after raising our HBM and total DRAM growth estimates over the next five years. Shares still look overvalued to us—in our view, they don't reflect the long-term cyclicality we expect from Micron's results.

- We expect a tremendous cyclical upswing over the next two to three years, but we don't think AI is eliminating cyclicality for Micron. While demand looks strong, a misalignment of supply with

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Sector	Industry
Technology	Semiconductors

Business Description

Micron is one of the largest semiconductor companies in the world, specializing in memory and storage chips. Its primary revenue stream comes from dynamic random access memory, or DRAM, and it also has minority exposure to not-and or NAND, flash chips. Micron serves a global customer base, selling chips into data centers, mobile phones, consumer electronics, and industrial and automotive applications. The firm is vertically integrated.

demand in the long term can lead to a cyclical downswing, as investors saw in 2023.

- We now expect $6 billion in HBM revenue for Micron in fiscal 2025 (ending in August,) rising toward $30 billion by the end of the decade. Our forecast implies HBM quickly becoming Micron's most meaningful driver in the next three years.

Business Strategy & Outlook William Kerwin, CFA, Senior Equity Analyst, 15 Aug 2024

We see Micron Technology as a strong supplier of memory chips, but we don’t believe the firm holds an economic moat. Micron benefits from large scale, being the fifth-largest chipmaker in the world, but we don’t see enough scale to generate consistent economic profits. Micron holds a third-place market share in dynamic random access memory, or DRAM, chips and a fifth-place market share in not-and, or NAND, flash chips. We view both the DRAM and NAND markets as highly cyclical, and we expect Micron to thrive in periods of strong demand and pricing, but to be vulnerable to downcycles that compress shipments, prices, and profits.

DRAM and NAND chips are vital components to data centers, consumer devices, cars, and industrial equipment. Nevertheless, we see these chips as commoditylike and suppliers like Micron producing mostly fungible chips. Thus, Micron and its peers are prone to market supply-and-demand dynamics. Periods of strong industry demand can be followed by periods of oversupply that crater pricing and firm profitability, as seen in Micron’s fiscal 2023. As a vertically integrated chipmaker, Micron has a significant fixed cost base and thus periods of lower volume have a major impact on profitability.

While we foresee cyclicality to continue, we see long-term growth for both the DRAM and NAND markets over the course of cycles. We expect data centers, mobile phones, and cars to require greater amounts of memory content, driven by secular trends toward artificial intelligence, 5G, and autonomous vehicles. In our view, Micron should be able to benefit from this growth with its scale, despite cyclical effects in the short term. We also like Micron’s shareholder distributions and view its balance sheet as good, for a cyclical memory chipmaker.

Finally, we caution investors about risk from China. The Chinese government effectively cut off Micron’s sales into Chinese data centers in 2023, which will have a material impact on sales and growth. Micron earns nondata-center revenue out of China, but we expect this to remain unrestricted, as these chips are for consumer and lagging-edge markets that are less critical to national security.

Bulls Say William Kerwin, CFA, Senior Equity Analyst, 26 Jun 2025

- When memory markets are in an upswing and demand is strong, Micron’s sales growth and profitability can be impressive.
- Micron is a major producer of DRAM and NAND chips with healthy market share positions, allowing it to benefit from secular trends toward AI, 5G, and connected cars.
- We like Micron’s shareholder returns and view its balance sheet as strong for a cyclical firm.

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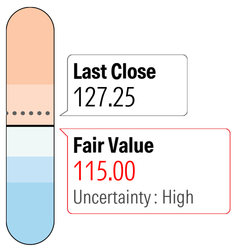
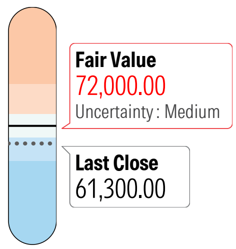
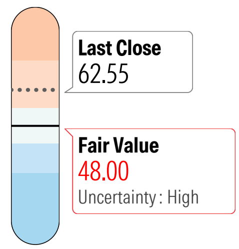
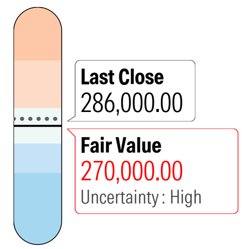
Competitors

	Micron Technology Inc MU	Samsung Electronics Co Ltd 005930	Western Digital Corp WDC	SK Hynix Inc 000660
				
Economic Moat	None	Narrow	None	None
Currency	USD	KRW	USD	KRW
Fair Value	115.00 26 Jun 2025 02:33, UTC	72,000.00 2 May 2025 04:13, UTC	48.00 1 May 2025 00:34, UTC	270,000.00 27 Jan 2025 07:01, UTC
1-Star Price	178.25	97,200.00	74.40	418,500.00
5-Star Price	69.00	50,400.00	28.80	162,000.00
Assessment	Overvalued 25 Jun 2025	Undervalued 25 Jun 2025	Overvalued 25 Jun 2025	Fairly Valued 25 Jun 2025
Morningstar Rating	★★★26 Jun 2025 02:34, UTC	★★★★25 Jun 2025 12:15, UTC	★★25 Jun 2025 21:23, UTC	★★★25 Jun 2025 12:16, UTC
Analyst	William Kerwin, Senior Equity Analyst	Kazunori Ito, Director	Eric Compton, Director	Kazunori Ito, Director
Capital Allocation	Standard	Standard	Standard	Standard
Price/Fair Value	1.11	0.85	1.30	1.06
Price/Sales	4.61	1.14	2.04	2.87
Price/Book	2.94	1.04	4.18	2.43
Price/Earning	30.89	11.89	13.38	8.26
Dividend Yield	0.36%	2.37%	0.16%	0.80%
Market Cap	142.21 Bil	412,893.05 Bil	21.82 Bil	197,438.54 Bil
52-Week Range	61.54—144.07	49,900.00—88,800.00	28.83—62.89	144,700.00—291,500.00
Investment Style	Large Value	Large Value	Mid Value	Large Value

Bears Say William Kerwin, CFA, Senior Equity Analyst, 26 Jun 2025

- Micron has a high fixed cost base that leaves it vulnerable to underutilization charges and major profit compression when memory markets enter a downturn.
- We see DRAM and NAND as commoditylike products, and we foresee little ability for Micron to build durable differentiation against its competitors.
- Micron has meaningful China exposure and bears the risk of further restrictions out of that market hampering its sales.

Economic Moat William Kerwin, CFA, Senior Equity Analyst, 15 Aug 2023

We do not believe Micron possesses an economic moat. The firm operates in the highly capital-intensive industries of DRAM and NAND flash semiconductors, and it doesn't earn good enough profit margins through the course of a cycle to give us confidence in enduring economic profits.

We view DRAM and NAND as commoditylike products prone to market supply-and-demand dynamics and steady pricing erosion that reduces industry profitability. While we see better margins in DRAM, which has consolidated to three primary players (versus six in NAND) we still don't see good enough returns on invested capital over the course of a cycle to merit a moat. We do expect to see years of positive economic profits during periods of tight supply and strong demand that help support good pricing, but we see steep downcycles giving rise to poor profitability and eroding the economic profits built up in a market upswing.

The majority of Micron's sales comes from DRAM chip sales. DRAM chips provide volatile random access memory, which is used to store memory during a system's operation, and only while a system is turned on. DRAM is a critical component for data center servers, computers, smartphones, and industrial applications. We see DRAM chips as commodity products, primarily sold by three suppliers—Samsung, SK Hynix, and Micron—that occupy over 90% of the market. DRAM technology generations last years, and we see the leading oligopoly players moving in step to successive generations and participating in an industry standards-setting body. DDR5 is the latest technology transition for mainstream DRAM, and while a player like Micron will cite technological leadership or being first to market, we view these chips as fungible and time-to-market differences of a quarter or two as immaterial to competitive positioning.

As a vertically integrated producer, Micron has massive capital investment needs that weigh on its returns on invested capital. The DRAM industry typically exhibits high-single-digit annual pricing declines, with the dominant players focusing not only on product advancement, but also advances in cost efficiency to keep up with their peers. This rapid pricing erosion makes it difficult for industry players to earn strong profits, even with large market shares. Consolidation of the DRAM industry and rational acting by players have helped improve industry margins. Still, we don't see current margin levels providing durable economic profit levels over the course of a cycle. The memory chip market is prone to bouts of undersupply that raise prices and profits, followed by gluts of supply that crater pricing. Downcycles can be severe, sometimes leading to negative returns on invested capital and negative profit margins.

Micron also has a meaningful NAND flash chip business that makes up the minority of sales. NAND flash chips provide nonvolatile memory for storage purposes. Compared with DRAM, NAND is used for longer-term storage of data for data centers and consumer hardware. NAND advancements happen at a much faster pace than those in DRAM, with suppliers putting out higher-density chip generations every 18-24 months. Similar to DRAM, while suppliers will tout technological differences like layer counts and being first to market, we view NAND chips as fungible and commoditylike among the leading players.

We view very similar dynamics in NAND as we do in DRAM: commodity products, high capital intensity, and volatile market cycles. NAND, however, is less consolidated of a market with six primary players. In our view, the more fragmented nature of the NAND market creates more volatile supply-and-demand dynamics with worse pricing and profitability in market downturns caused by oversupply. NAND is also even more capital intensive than DRAM is, which we attribute to faster advancement and shorter product generations, and exhibits steeper annual pricing declines typically in the midteens. All of this leads to a lower margin profile for NAND compared with DRAM, as well as lower returns on invested capital.

Fair Value and Profit Drivers William Kerwin, CFA, Senior Equity Analyst, 26 Jun 2025

Our fair value estimate for Micron is $115 per share. Our valuation implies a fiscal 2025 adjusted price/earnings multiple of 15 times and an enterprise value/sales multiple of 3.5 times. The greatest drivers to our valuation are cyclical sales and cyclical profitability over a fixed cost base.

We forecast Micron's results to be highly cyclical, and note that fiscal 2023 represented one of the most severe downturns we've seen for the chipmaker, with gluts of chip supply for data centers, smartphones, and PCs following post-pandemic-era demand. Micron was also hampered in fiscal 2023 by the loss of revenue coming from memory sales into Chinese data center customers, thanks to retaliatory moves against other US government restrictions.

We believe Micron's key end markets bottomed in fiscal 2023, and we expect sequential recovery to continue in fiscal 2025. After more than 60% revenue growth in fiscal 2024, we forecast more than 45% growth in fiscal 2025. We expect strong AI demand for Micron's HBM chips to drive double-digit growth in fiscal 2026 as well. Thereafter, we model a tapering down to midcycle mid-single-digit growth. While the DRAM and NAND markets can be volatile, we view long-term trends exhibiting growth in bit shipments (which equates to volume) and declines in prices per bit. In DRAM, we expect high-teens bit growth and roughly high-single-digit annual pricing declines over the long term. In NAND, we expect midteens bit growth and roughly 15% annual pricing declines over the long term.

Practically all of Micron's costs of sales are fixed. Despite revenue cut in half in fiscal 2023, cost of sales was roughly flat, leading to a negative 8% non-GAAP gross margin. We expect Micron to continue investing in manufacturing for the long term, and gross margins to move in line with volumes. We see a recovery to a level surpassing 40% in fiscal 2026.

Micron's operating expenses are more malleable than manufacturing. We forecast steady growth in research and development in the midsingle digits in the long term, and for other operating expenses to move with top-line volume. Still, Micron's operating margins will be heavily dictated by its gross margins. At midcycle, we think Micron can earn close to 30% non-GAAP operating margins.

Risk and Uncertainty William Kerwin, CFA, Senior Equity Analyst, 21 Mar 2024

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We assign Micron a Morningstar Uncertainty Rating of High. Micron's largest risk comes from its high cyclicality, in our view. As a memory chipmaker, Micron is susceptible to fluctuations in market supply and demand for commoditylike chips, and periods of oversupply can slash prices. Micron is vertically integrated with a high fixed cost base, so weak pricing can have an outsize effect on profitability, as seen in fiscal 2023.

Micron also bears risk from its China exposure, which sits at roughly 25% of sales. The Chinese government issued restrictions on Micron's sales into data centers in 2023, effectively cutting off roughly 10% of the firm's revenue. The other 15% sells into consumer electronics and autos, which we think poses less of a national security risk. Still, escalating trade tensions could see a complete barring of US-produced memory chips, or alleviated restrictions could see Micron regain its cutoff revenue.

We see some risk from the relatively unconsolidated NAND market. We expect consolidation over the long term in NAND, and if Micron is left on the outside of consolidation, it could be left with a gap in scale relative to peers in NAND production, which could hurt its ability to reduce costs and maintain profitability.

Finally, we note some customer concentration for Micron, with roughly half of its sales coming from its top 10 customers. This concentration is mainly from distributors, and we don't expect these customers to churn. Still, losing one or more of these material customers could have a negative impact on results.

On the environmental, social, and governance front, we foresee little risk to Micron. Its primary risks would arise from its environmental footprint as a manufacturer and its ability to retain human capital.

Capital Allocation William Kerwin, CFA, Senior Equity Analyst, 15 Aug 2024

We assign Micron a Standard Morningstar Capital Allocation Rating, primarily driven by our view of fair investments. We believe Micron invests adequately to maintain its position in the DRAM and NAND markets, and we don't believe greater investment would improve its position. Micron targets more than 30% of sales going to capital expenditure and roughly 10% of sales to go toward research and development, both of which roughly match peers. While Micron benefited from DRAM consolidation a decade ago, we see little opportunity for acquisitions now, and we believe that shareholder distributions as a second priority to organic investment is appropriate. We see Micron's balance sheet as sound, and its distributions as appropriate. Micron is leveraged, but it holds long-dated debt and we believe its cash flow will be more than enough to cover its obligations over the long term. We also see Micron's quarterly dividend and opportunistic repurchases (in upcycle periods, typically) as a good return to investors with few other investment opportunities.

Analyst Notes Archive

AI DeepSeek Coverage Summary: Maintaining Our Fair Values; Pullback Was Healthy Eric Compton,

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CFA,Director,28 Jan 2025

We have consolidated our recent DeepSeek-related coverage in this note. Artificial intelligence affects companies across much of our coverage, including semiconductors, cloud infrastructure, software, utilities, and energy.Many of the firms under our coverage with an “AI premium” were already trading in 1- to 2-star territory. Our valuations were already positioned for a pullback of this nature, as we were having a hard time justifying the increases in revenue implied by these valuations. We view the current pullback as healthy, even as we remain positive on the long-term potential of AI. We have maintained our fair value estimates across the affected companies.Our thesis, after the release of DeepSeek, is that we were going to see instances of sleeker, more-efficient AI models that would not rely on massive clusters of AI GPUs and related hardware. This was the only way the ecosystem was going to successfully address large numbers of use cases in the long term. We believe that lower costs—making AI cheaper, therefore more economical—increase the number of use cases it is viable for, and as a result, should increase demand. This is the same path the PC revolution followed, with computing power becoming cheap enough that millions of individuals could use it at an affordable cost. The same happened with the cloud and SaaS revolution thereafter, where the incremental cost of adding users was close to zero. We believe a future where AI was both prohibitively expensive and also “taking over the world” was not likely. As such, we view the advancements made by DeepSeek as promising and healthy for the overall ecosystem.For more in-depth coverage on specific industries, please refer to our notes on Nvidia, the hyperscalers, semiconductor equipment companies, TSMC, Apple and networking, utilities, European utilities, HVAC, and industrials.

DeepSeek R1 Model Doesn't Alter Our Valuations or Forecasts for Technology Hardware Stocks

William Kerwin, CFA,Senior Equity Analyst,27 Jan 2025

Many technology hardware stocks under our coverage plunged in Monday trading after reports of DeepSeek's R1 generative artificial intelligence model out of China offering performance parity to top US models at a much lower training cost. The iShares Semiconductor ETF was down 8% in midday trading.Why it matters: In our view, the market selloff implies fears of weaker future generative AI infrastructure investment resulting from cheaper models. We are less pessimistic and expect strong generative AI investment to continue. We've expected generative AI models to become slimmer and more efficient. We expect US model builders to develop more efficient models, but overall hardware spending will continue to rise, particularly with a serious competitive alternative out of China. In the longer term, we foresee a commoditization of AI models that shouldn't diminish investment in hardware infrastructure. Lower-cost models should accelerate the path to financial returns for model builders, but that they will continue to invest heavily in hardware to support them.The bottom line: We maintain our fair value estimates and moat ratings for our technology hardware coverage, including Apple, Broadcom, Marvell Technology, Arista Networks, and Micron Technology. The DeepSeek news and market selloff don't alter our long-term forecasts today. We don't expect a cut to infrastructure investment in the short term and believe US and European model builders will continue to invest heavily in developing larger and higher-performing models. Demand still exceeds chip supply, and we don't expect that to change due to the DeepSeek news. We believe the selloff largely reflects more uncertainty being priced into AI-exposed stocks, which we believe to be reasonable. We believe AI investment will continue to rise rapidly, but that more bullish forecasts might have underestimated efficiency gains in new models.

Micron Earnings: Weak Outlook Leads Us to Lower Our NAND Forecast and Trim Our Fair Value to $100 William Kerwin, CFA,Senior Equity Analyst,19 Dec 2024

Micron Technology's November-quarter results met management guidance, highlighted by revenue rising 12% sequentially to $8.7 billion. The firm's outlook for the February quarter implies a 9% sequential decline in revenue, with management citing weakness in PC and mobile phone demand. Why it matters: Micron's outlook was more than 10% below our expectations. We now expect significantly weaker NAND revenue for Micron in fiscal 2025, as the firm's NAND chip sales are more exposed to PC and mobile phone shipments. We also expect this to weigh on gross margin. We expect lower medium-term NAND results as well, with management announcing plans to cut its capital investment in NAND production and to reduce utilization at its existing factories. We don't see a near-term upward inflection for PC and smartphone demand. Positively, management raised its expectations for high-bandwidth memory growth over the next five years. We expect better DRAM and HBM shipments into data centers to partially offset our weaker NAND forecast. The bottom line: We lower our fair value estimate for no-moat Micron to $100 per share from $110 based on our lower revenue forecast. Shares look slightly undervalued after a 15% decline after hours, but we remind investors of our High Morningstar Uncertainty Rating on the cyclical stock. Our updated forecast accounts for a greater mix of DRAM revenue for Micron over the next five years, with higher revenue growth for HBM chips into data centers and lower revenue for NAND flash chips. Long-term, we see Micron's most promising growth driver to be its DRAM and HBM chips. We are skeptical of a snapback in revenue after the February quarter, given that we expect increasing pricing pressure for both DRAM and NAND. We expect growth in bit shipments in the May and August quarters, but believe a return to normal pricing declines will offset the impact of this on revenue.

Micron Earnings: Great Guidance Appears to Reassure the Market, and Shares Now Look Fairly Valued William Kerwin, CFA,Senior Equity Analyst,26 Sep 2024

We maintain our $110 fair value estimate for shares of no-moat Micron Technology as we hold our medium-term forecast steady even after tremendous August quarter results. Micron's quarterly results came in at or above the high end of its guidance ranges, and its November quarter guidance beat our model. The firm benefits from a broad and strong upcycle in memory chip demand, aided by AI-related

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demand. We believe this upswing should continue through calendar 2025. Still, we expect growth to decelerate through 2025 and forecast cyclicality for Micron in the long term, which informs our no-moat rating.Micron's stock has been seeing downward pressure since its last earnings report three months ago, with a number of analyst downgrades citing concerns of oversupply in DRAM chips. We don't share these concerns in the short term and believe Micron's strong guide aligns with our view for tight supply to fuel another year of strong growth in fiscal 2025. The market responded positively to guidance, with shares up as much as 14% after-hours. The stock is now trading close to our fair value estimate.August quarter revenue rose 93% year over year and 14% sequentially to $7.75 billion. DRAM continues to drive Micron's results, but DRAM and NAND showed more than 90% year-over-year growth as these markets recover from the steep cyclical downturn seen in fiscal 2023. We believe DRAM growth is broad-based but supplemented by robust demand for high-bandwidth memory chips that serve AI applications. HBM is still a small minority of total revenue today, but we forecast it to rise above 10% of Micron's revenue in the next two years.November quarter guidance was impressive, implying 12% sequential revenue growth and 300 basis points of gross margin expansion at the midpoints. We believe growth will be driven by growth for shipments and pricing in fiscal 2025. Rising prices also contribute to our expectations for meaningful margin expansion in fiscal 2025.

Micron Earnings: We Raise Our DRAM Forecast and Valuation Behind Stronger Pricing Assumptions

William Kerwin, CFA,Senior Equity Analyst,27 Jun 2024

We raise our fair value estimate for no-moat Micron Technology to $110 per share, from $80, behind a higher medium-term growth and margin forecast. We now expect significant growth through fiscal 2026 for Micron, driven primarily by higher DRAM expectations. We believe high-bandwidth memory, or HBM, will augment growth, but we also expect standard DRAM to benefit from strong pricing over the next few years. AI investment is a meaningful contributor to our forecast across both HBM and standard DRAM, with data center GPUs requiring higher memory content, as well as higher content in AI-enabled PCs and smartphones. We see demand outpacing supply through calendar 2025, supporting high prices that should drive strong revenue for Micron. We also expect gross margins to benefit from strong pricing and a rising mix of HBM revenue, which is margin-accretive already.Micron's fiscal third-quarter results aligned with our updated forecast, and the firm continues to rebound meaningfully from a cyclical trough in fiscal 2023. Shares dropped as much as 7% after hours upon results, which we attribute to the market wanting even better guidance from AI. We see shares as overvalued, even at our new valuation. Long term, we continue to see Micron as cyclical, and we expect softer results after our forecast for increasingly normal strength through fiscal 2026.May quarter revenue rose 82% year over year and 17% sequentially to $6.8 billion, as Micron continues to recover revenue from a sharp cyclical downturn in fiscal 2023. Both DRAM and NAND revenue rose in line with firm revenue growth. We expect sequential growth to continue for both DRAM and NAND through fiscal 2025, and for Micron to reach record revenue in both fiscal 2025 and fiscal 2026. Micron's gross margin is improving in line

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with revenue, and we similarly expect margin expansion through fiscal 2026.

Micron Earnings: Valuation Up 14% to $80 Behind Strong Recovery and AI, but Shares Still Look Pricey William Kerwin, CFA,Senior Equity Analyst,21 Mar 2024

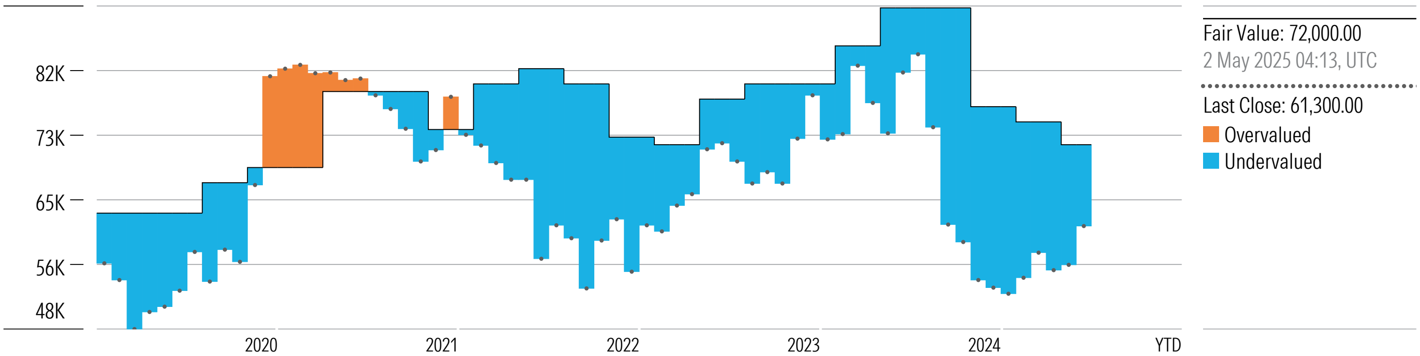
We raise our fair value estimate for shares of no-moat Micron Technology to $80, from $70, as we raise our short-term forecasts after the firm reported strong February-quarter results and an outlook for the May quarter above our model. We believe Micron has more strength to come in the next two years as it benefits from rebounding prices in both DRAM and NAND memory chips after steep downturns in 2023. We expect Micron to also see upside to the underlying DRAM market rebound as it develops rising penetration in high-bandwidth memory, or HBM, which is an input into graphics processing units, or GPUs, from the likes of Nvidia that run artificial intelligence models. Still, we believe Micron will continue to be prone to memory market cyclicality (as seen in 2023) over the long term, and we forecast more tepid growth after fiscal 2025. We continue to see shares as overvalued and recommend investors seek a better entry point.February-quarter sales rose 58% year over year and 23% sequentially to $5.8 billion, well ahead of company guidance. We credit Micron's DRAM sales for the beat, which are benefiting from improving market prices and the firm's adoption by Nvidia as a second source for HBM in its GPUs, like the new B200. All of Micron's end markets grew revenue meaningfully in the quarter, but we were most impressed by its sales into data centers, which include HBM spending for artificial intelligence. Positively, NAND flash sales also finally showed signs of a stronger recovery, rising 77% year over year.Guidance for the May quarter beat both our expectations and those of consensus and, in our view, led to the after-hours stock price rising as much as 16%. At the midpoint, sales of $6.6 billion imply 75% year-over-year growth and 13% sequential growth. We believe strong growth will continue to be driven by improving DRAM and NAND pricing, as seen in the February quarter.

Morningstar Equity Analyst Report | Report as of 26 Jun 2025 02:40, UTC | Reporting Currency: USD | Trading Currency: USD | Exchange: NASDAQ - ALL MARKETS

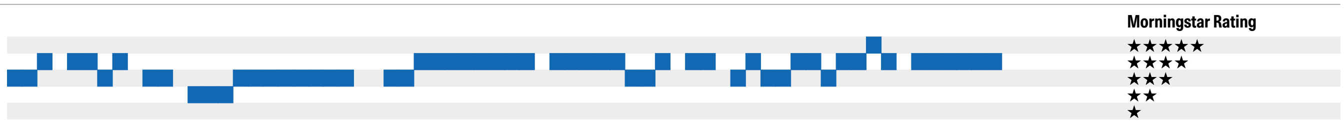
Micron Technology Inc MU ★★★ 26 Jun 2025 02:34, UTC

Competitors Price vs. Fair Value

Samsung Electronics Co Ltd 005930

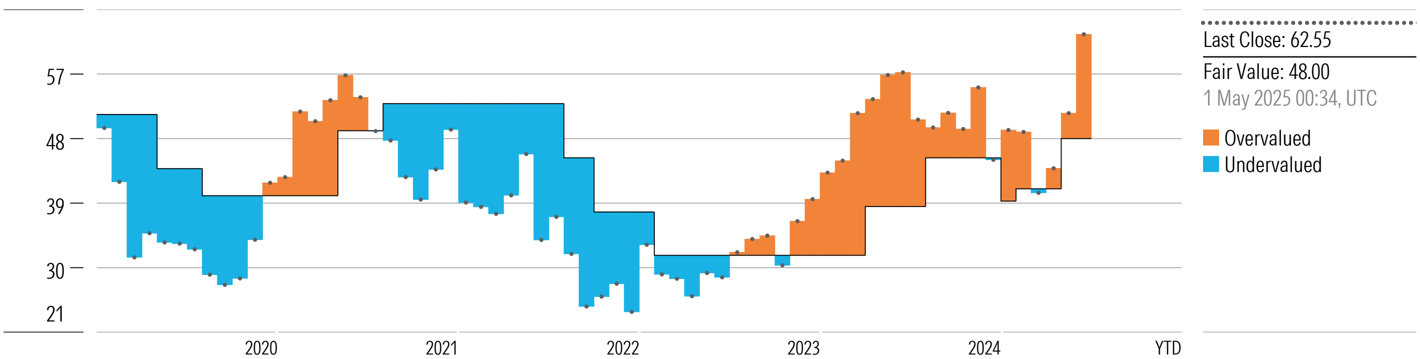


	2020	2021	2022	2023	2024	YTD
Price/Fair Value	1.17	1.06	0.76	0.98	0.69	0.85
Total Return %	50.04	-1.75	-27.60	44.56	-30.39	15.91

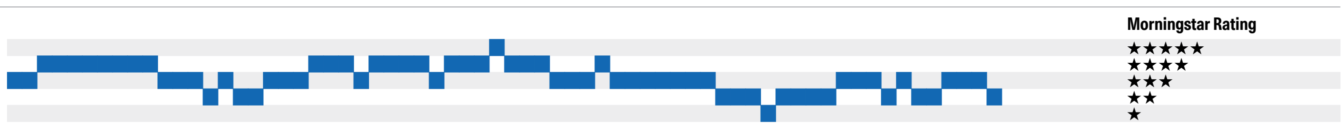


Total Return % as of 25 Jun 2025. Last Close as of 25 Jun 2025. Fair Value as of 2 May 2025 04:13, UTC.

Western Digital Corp WDC



	2020	2021	2022	2023	2024	YTD
Price/Fair Value	1.05	0.93	0.63	1.25	0.99	1.30
Total Return %	-11.15	17.73	-51.62	65.99	13.86	38.08



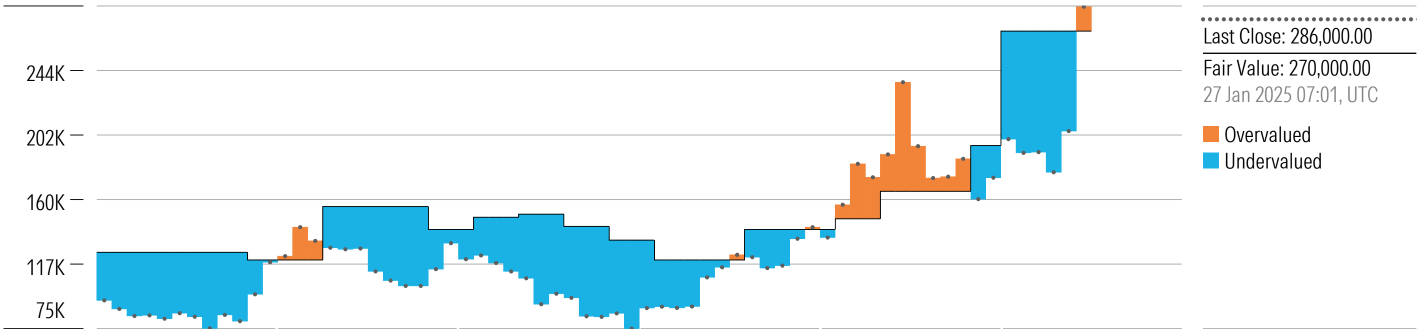
Total Return % as of 25 Jun 2025. Last Close as of 25 Jun 2025. Fair Value as of 1 May 2025 00:34, UTC.

Morningstar Equity Analyst Report | Report as of 26 Jun 2025 02:40, UTC | Reporting Currency: USD | Trading Currency: USD | Exchange: NASDAQ - ALL MARKETS

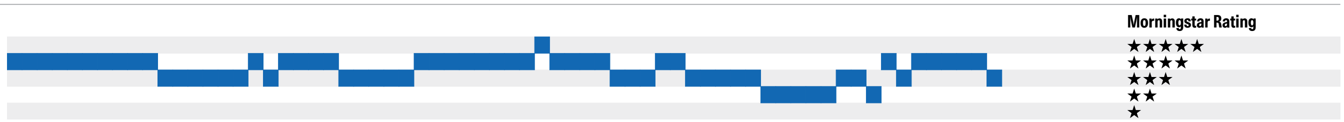
Micron Technology Inc MU ★★★ 26 Jun 2025 02:34, UTC

Competitors Price vs. Fair Value

SK Hynix Inc 000660



	2020	2021	2022	2023	2024	YTD	
	0.99	0.94	0.56	1.01	0.89	1.06	Price/Fair Value
	27.00	11.65	-41.87	90.27	23.53	65.43	Total Return %



Total Return % as of 25 Jun 2025. Last Close as of 25 Jun 2025. Fair Value as of 27 Jan 2025 07:01, UTC.

Morningstar Equity Analyst Report | Report as of 26 Jun 2025 02:40, UTC | Reporting Currency: USD | Trading Currency: USD | Exchange: NASDAQ - ALL MARKETS

Micron Technology Inc MU ★★★ 26 Jun 2025 02:34, UTC

Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Equity Style Box	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
127.25 USD 25 Jun 2025	115.00 USD 26 Jun 2025 02:33, UTC	1.11	142.21 USD Bil 25 Jun 2025	None	Large Value	High	Standard	4 Jun 2025 05:00, UTC

Morningstar Valuation Model Summary

Financials as of 25 Jun 2025	Actual			Forecast				
Fiscal Year, ends 31 Aug	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**
Revenue (USD Mil)	30,758	15,540	25,111	36,799	44,671	47,288	46,613	49,704
Operating Income (USD Mil)	9,716	-5,450	1,054	9,246	12,974	14,172	11,694	13,470
EBITDA (USD Mil)	16,818	2,011	9,084	17,689	24,978	27,299	25,099	28,268
Adjusted EBITDA (USD Mil)	17,397	2,937	9,715	18,709	26,038	28,471	26,255	29,497
Net Income (USD Mil)	8,687	-5,833	778	7,943	10,392	11,222	9,272	10,764
Adjusted Net Income (USD Mil)	9,369	-4,864	1,453	8,668	11,163	12,107	10,166	11,710
Free Cash Flow To The Firm (USD Mil)	4,734	-7,992	-73	1,154	8,660	7,714	6,687	7,903
Weighted Average Diluted Shares Outstanding (Mil)	1,122	1,093	1,118	1,125	1,121	1,114	1,107	1,100
Earnings Per Share (Diluted) (USD)	7.75	-5.34	0.70	7.06	9.27	10.08	8.38	9.78
Adjusted Earnings Per Share (Diluted) (USD)	8.35	-4.45	1.30	7.70	9.96	10.87	9.19	10.64
Dividends Per Share (USD)	0.42	0.46	0.46	0.46	0.46	0.50	0.54	0.58

Margins & Returns as of 25 Jun 2025		Actual			Forecast					
	3 Year Avg	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**5 Year Avg**
Operating Margin %	-0.1	31.6	-35.1	4.2	25.1	29.0	30.0	25.1	27.1	27.0
EBITDA Margin %	—	54.7	12.9	36.2	48.1	55.9	57.7	53.8	56.9	—
Adjusted EBITDA Margin %	—	56.6	18.9	38.7	50.8	58.3	60.2	56.3	59.4	57.0
Net Margin %	-2.1	28.2	-37.5	3.1	21.6	23.3	23.7	19.9	21.7	22.0
Adjusted Net Margin %	1.7	30.5	-31.3	5.8	23.5	25.0	25.6	21.8	23.6	23.9
Free Cash Flow To The Firm Margin %	-12.1	15.4	-51.4	-0.3	3.1	19.4	16.3	14.4	15.9	13.8

Growth & Ratios as of 25 Jun 2025		Actual			Forecast					
	3 Year CAGR	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**5 Year CAGR**
Revenue Growth %	-3.2	11.0	-49.5	61.6	46.6	21.4	5.9	-1.4	6.6	14.6
Operating Income Growth %	-46.5	41.5	-156.1	-119.3	777.2	40.3	9.2	-17.5	15.2	66.5
EBITDA Growth %	99.4	34.6	-88.0	351.7	94.7	41.2	9.3	-8.1	12.6	29.9
Adjusted EBITDA Growth %	-11.2	25.3	-83.1	230.8	92.6	39.2	9.4	-7.8	12.4	24.9
Earnings Per Share Growth %	-48.6	50.8	-168.9	-113.1	908.6	31.3	8.7	-16.9	16.8	69.5
Adjusted Earnings Per Share Growth %	-48.6	37.8	-153.3	-129.2	492.7	29.2	9.2	-15.5	15.8	69.5

Valuation as of 25 Jun 2025	Actual			Forecast				
	2022	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**
Price/Earning	6.5	-15.0	76.7	16.5	12.8	11.7	13.8	12.0
Price/Sales	2.0	4.9	4.2	3.9	3.2	3.0	3.1	2.9
Price/Book	1.2	1.7	2.5	2.7	2.3	2.0	1.8	1.6
Price/Cash Flow	—	—	—	—	—	—	—	—
EV/EBITDA	3.4	27.3	11.5	7.9	5.7	5.2	5.6	5.0
EV/EBIT	6.1	-14.7	106.5	16.0	11.4	10.4	12.6	11.0
Dividend Yield %	0.8	0.7	0.5	0.4	0.4	0.4	0.4	0.5
Dividend Payout %	5.0	-10.3	35.4	6.0	4.6	4.6	5.9	5.5
Free Cash Flow Yield %	—	—	—	—	—	—	—	—

Operating Performance / Profitability as of 25 Jun 2025	Actual			Forecast				
Fiscal Year, ends 31 Aug	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**
ROA %	13.1	-9.1	1.1	10.4	12.2	12.0	9.2	9.9
ROE %	17.4	-13.2	1.7	15.1	16.9	15.8	11.8	12.3
ROIC %	16.8	-7.1	2.4	12.6	15.7	16.1	12.8	14.0

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Micron Technology Inc MU ★★★ 26 Jun 2025 02:34, UTC

Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Equity Style Box	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
127.25 USD 25 Jun 2025	115.00 USD 26 Jun 2025 02:33, UTC	1.11	142.21 USD Bil 25 Jun 2025	None	Large Value	High	Standard	4 Jun 2025 05:00, UTC

Financial Leverage (Reporting Currency)	Actual			Forecast				
Fiscal Year, ends 31 Aug	2022	2023	2024	2025	2026	2027	2028	2029
Debt/Capital %	10.8	15.4	11.6	8.9	7.4	5.8	5.1	3.7
Assets/Equity	1.3	1.5	1.5	1.5	1.4	1.3	1.3	1.2
Net Debt/EBITDA	-0.1	2.2	0.6	0.3	-0.1	-0.3	-0.5	-0.7
Total Debt/EBITDA	0.4	4.7	1.4	0.7	0.4	0.3	0.3	0.2
EBITDA/ Net Interest Expense	132.8	-33.8	151.8	122.3	130.2	170.1	268.9	943.8

Forecast Revisions as of 25 Jun 2025	2025		2026		2027	
Prior data as of 21 Mar 2025	Current	Prior	Current	Prior	Current	Prior
Fair Value Estimate Change (Trading Currency)	115.00	99.79	—	—	—	—
Revenue (USD Mil)	36,799	34,306	44,671	37,552	47,288	40,981
Operating Income (USD Mil)	9,246	7,651	12,974	8,093	14,172	9,262
EBITDA (USD Mil)	18,709	17,480	26,038	19,159	28,471	21,745
Net Income (USD Mil)	8,668	7,031	11,163	7,397	12,107	8,472
Earnings Per Share (Diluted) (USD)	7.06	5.76	9.27	5.71	10.08	6.65
Adjusted Earnings Per Share (Diluted) (USD)	7.70	6.28	9.96	6.66	10.87	7.68
Dividends Per Share (USD)	0.46	0.46	0.46	0.48	0.50	0.52

Key Valuation Drivers as of 25 Jun 2025	
Cost of Equity %	9.0
Pre-Tax Cost of Debt %	5.8
Weighted Average Cost of Capital %	8.6
Long-Run Tax Rate %	19.0
Stage II EBI Growth Rate %	7.0
Stage II Investment Rate %	40.0
Perpetuity Year	10

Additional estimates and scenarios available for download at https://pitchbook.com/.

Discounted Cash Flow Valuation as of 25 Jun 2025	USD Mil
Present Value Stage I	24,483
Present Value Stage II	20,602
Present Value Stage III	83,181
Total Firm Value	**128,267**
Cash and Equivalents	8,106
Debt	13,397
Other Adjustments	0
Equity Value	**122,976**
Projected Diluted Shares	1,125
Fair Value per Share (USD)	**115.00**

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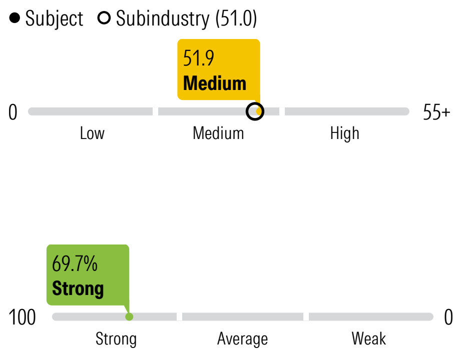
Micron Technology Inc MU ★★★ 26 Jun 2025 02:34, UTC

Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Equity Style Box	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
127.25 USD 25 Jun 2025	115.00 USD 26 Jun 2025 02:33, UTC	1.11	142.21 USD Bil 25 Jun 2025	None	Large Value	High	Standard	4 Jun 2025 05:00, UTC

ESG Risk Rating Breakdown

Exposure		
Company Exposure[1]	51.9
– Manageable Risk	47.7
Unmanageable Risk[2]	**4.2**
Management		
Manageable Risk	47.7
– Managed Risk[3]	33.2
Management Gap[4]	**14.5**
Overall Unmanaged Risk	**18.6**



- Exposure represents a company's vulnerability to ESG risks driven by their business model
- Exposure is assessed at the Subindustry level and then specified at the company level
- Scoring ranges from 0-55+ with categories of low, medium, and high-risk exposure

- Management measures a company's ability to manage ESG risks through its commitments and actions
- Management assesses a company's efficiency on ESG programs, practices, and policies
- Management score ranges from 0-100% showing how much manageable risk a company is managing

ESG Risk Rating

ESG Risk Ratings measure the degree to which a company's value is impacted by environmental, social, and governance risks, by evaluating the company's ability to manage the ESG risks it faces.

1. A company's Exposure to material ESG issues 2. Unmanageable Risk refers to risks that are inherent to a particular business model that cannot be managed by programs or initiatives 3. Managed Risk = Manageable Risk multiplied by a Management score of 69.7% 4. Management Gap assesses risks that are not managed, but are considered manageable 5. ESG Risk Rating Assessment = Overall Unmanaged Risk = Management Gap plus Unmanageable Risk

ESG Risk Rating Assessment[5]

ESG Risk Rating is of Jun 04, 2025. Highest Controversy Level is as of Jun 08, 2025. Sustainalytics Subindustry: Semiconductor Design and Manufacturing. Sustainalytics provides Morningstar with company ESG ratings and metrics on a monthly basis and as such, the ratings in Morningstar may not necessarily reflect current Sustainalytics' scores for the company. For the most up to date rating and more information, please visit: sustainalytics.com/esg-ratings/.

Peer Analysis 04 Jun 2025

Peers are selected from the company's Sustainalytics-defined Subindustry and are displayed based on the closest market cap values

Company Name	Exposure		Management		ESG Risk Rating	
Micron Technology Inc	51.9 | Medium	0 – 55+	69.7 | Strong	100 – 0	18.6 | Low	0 – 40+
Western Digital Corp	32.2 | Low	0 – 55+	63.7 | Strong	100 – 0	12.7 | Low	0 – 40+
Samsung Electronics Co Ltd	38.0 | Medium	0 – 55+	64.8 | Strong	100 – 0	15.1 | Low	0 – 40+
SK Hynix Inc	51.2 | Medium	0 – 55+	71.3 | Strong	100 – 0	17.3 | Low	0 – 40+
—	— | —	0 – 55+	— | —	100 – 0	— | —	0 – 40+

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Appendix
Historical Morningstar Rating

Micron Technology Inc MU 25 Jun 2025 21:17, UTC

Dec 2025	Nov 2025	Oct 2025	Sep 2025	Aug 2025	Jul 2025	Jun 2025	May 2025	Apr 2025	Mar 2025	Feb 2025	Jan 2025
—	—	—	—	—	—	★★	★★★	★★★★	★★★	★★★	★★★
Dec 2024	Nov 2024	Oct 2024	Sep 2024	Aug 2024	Jul 2024	Jun 2024	May 2024	Apr 2024	Mar 2024	Feb 2024	Jan 2024
★★★	★★★	★★★	★★★	★★★	★★★	★★	★	★★	★★	★★	★★
Dec 2023	Nov 2023	Oct 2023	Sep 2023	Aug 2023	Jul 2023	Jun 2023	May 2023	Apr 2023	Mar 2023	Feb 2023	Jan 2023
★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★★	★★★
Dec 2022	Nov 2022	Oct 2022	Sep 2022	Aug 2022	Jul 2022	Jun 2022	May 2022	Apr 2022	Mar 2022	Feb 2022	Jan 2022
★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★	★★★	★★★
Dec 2021	Nov 2021	Oct 2021	Sep 2021	Aug 2021	Jul 2021	Jun 2021	May 2021	Apr 2021	Mar 2021	Feb 2021	Jan 2021
★★★	★★★	★★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★	★★★
Dec 2020	Nov 2020	Oct 2020	Sep 2020	Aug 2020	Jul 2020	Jun 2020	May 2020	Apr 2020	Mar 2020	Feb 2020	Jan 2020
★★	★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★

Samsung Electronics Co Ltd 005930 25 Jun 2025 12:15, UTC

Dec 2025	Nov 2025	Oct 2025	Sep 2025	Aug 2025	Jul 2025	Jun 2025	May 2025	Apr 2025	Mar 2025	Feb 2025	Jan 2025
—	—	—	—	—	—	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★
Dec 2024	Nov 2024	Oct 2024	Sep 2024	Aug 2024	Jul 2024	Jun 2024	May 2024	Apr 2024	Mar 2024	Feb 2024	Jan 2024
—	★★★★	★★★★★	★★★★	★★★★	★★★	★★★★	★★★★	★★★	★★★	★★★★	★★★
Dec 2023	Nov 2023	Oct 2023	Sep 2023	Aug 2023	Jul 2023	Jun 2023	May 2023	Apr 2023	Mar 2023	Feb 2023	Jan 2023
—	★★★★	★★★★	—	★★★★	★★★	★★★	★★★★	★★★★	★★★★	★★★★	★★★★
Dec 2022	Nov 2022	Oct 2022	Sep 2022	Aug 2022	Jul 2022	Jun 2022	May 2022	Apr 2022	Mar 2022	Feb 2022	Jan 2022
—	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★	★★★	—
Dec 2021	Nov 2021	Oct 2021	Sep 2021	Aug 2021	Jul 2021	Jun 2021	May 2021	Apr 2021	Mar 2021	Feb 2021	Jan 2021
—	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★	★★	★★
Dec 2020	Nov 2020	Oct 2020	Sep 2020	Aug 2020	Jul 2020	Jun 2020	May 2020	Apr 2020	Mar 2020	Feb 2020	Jan 2020
—	★★★	★★★	—	★★★★	★★★	★★★★	★★★★	—	★★★★	★★★	★★★

Western Digital Corp WDC 25 Jun 2025 21:23, UTC

Dec 2025	Nov 2025	Oct 2025	Sep 2025	Aug 2025	Jul 2025	Jun 2025	May 2025	Apr 2025	Mar 2025	Feb 2025	Jan 2025
—	—	—	—	—	—	★★	★★★	★★★	★★★	★★	★★
Dec 2024	Nov 2024	Oct 2024	Sep 2024	Aug 2024	Jul 2024	Jun 2024	May 2024	Apr 2024	Mar 2024	Feb 2024	Jan 2024
★★★	★★	★★★	★★★	★★★	★★	★★	★★	★★	★	★★	★★
Dec 2023	Nov 2023	Oct 2023	Sep 2023	Aug 2023	Jul 2023	Jun 2023	May 2023	Apr 2023	Mar 2023	Feb 2023	Jan 2023
★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★★	★★★	★★★	★★★
Dec 2022	Nov 2022	Oct 2022	Sep 2022	Aug 2022	Jul 2022	Jun 2022	May 2022	Apr 2022	Mar 2022	Feb 2022	Jan 2022
★★★★	★★★★	★★★★	★★★★★	★★★★	★★★★	★★★★	★★★	★★★★	★★★★	★★★★	★★★★
Dec 2021	Nov 2021	Oct 2021	Sep 2021	Aug 2021	Jul 2021	Jun 2021	May 2021	Apr 2021	Mar 2021	Feb 2021	Jan 2021
★★★	★★★★	★★★★	★★★★	★★★	★★★	★★★	★★	★★	★★★	★★	★★★
Dec 2020	Nov 2020	Oct 2020	Sep 2020	Aug 2020	Jul 2020	Jun 2020	May 2020	Apr 2020	Mar 2020	Feb 2020	Jan 2020
★★★	★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★	★★★

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SK Hynix Inc 000660 25 Jun 2025 12:16, UTC

Dec 2025	Nov 2025	Oct 2025	Sep 2025	Aug 2025	Jul 2025	Jun 2025	May 2025	Apr 2025	Mar 2025	Feb 2025	Jan 2025
—	—	—	—	—	—	★★★	★★★★	★★★★	★★★★	★★★★	★★★★
Dec 2024	Nov 2024	Oct 2024	Sep 2024	Aug 2024	Jul 2024	Jun 2024	May 2024	Apr 2024	Mar 2024	Feb 2024	Jan 2024
★★★	★★★★	★★	★★★	★★★	★★	★★	★★	★★	★★	★★★	★★★
Dec 2023	Nov 2023	Oct 2023	Sep 2023	Aug 2023	Jul 2023	Jun 2023	May 2023	Apr 2023	Mar 2023	Feb 2023	Jan 2023
★★★	★★★	★★★	★★★★	★★★★	★★★	★★★	★★★	★★★★	★★★★	★★★★	★★★★
Dec 2022	Nov 2022	Oct 2022	Sep 2022	Aug 2022	Jul 2022	Jun 2022	May 2022	Apr 2022	Mar 2022	Feb 2022	Jan 2022
★★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★	★★★	★★★
Dec 2021	Nov 2021	Oct 2021	Sep 2021	Aug 2021	Jul 2021	Jun 2021	May 2021	Apr 2021	Mar 2021	Feb 2021	Jan 2021
★★★	★★★	★★★★	★★★★	★★★★	★★★★	★★★	★★★★	★★★	★★★	★★★	★★★
Dec 2020	Nov 2020	Oct 2020	Sep 2020	Aug 2020	Jul 2020	Jun 2020	May 2020	Apr 2020	Mar 2020	Feb 2020	Jan 2020
★★★	★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★

Research Methodology for Valuing Companies

Overview

At the heart of our valuation system is a detailed projection of a company's future cash flows, resulting from our analysts' research. Analysts create custom industry and company assumptions to feed income statement, balance sheet, and capital investment assumptions into our globally standardized, proprietary discounted cash flow, or DCF, modeling templates. We use scenario analysis, indepth competitive advantage analysis, and a variety of other analytical tools to augment this process. Moreover, we think analyzing valuation through discounted cash flows presents a better lens for viewing cyclical companies, high-growth firms, businesses with finite lives (e.g., mines), or companies expected to generate negative earnings over the next few years. That said, we don't dismiss multiples altogether but rather use them as supporting cross-checks for our DCF-based fair value estimates. We also acknowledge that DCF models offer their own challenges (including a potential proliferation of estimated inputs and the possibility that the method may miss shortterm market-price movements), but we believe these negatives are mitigated by deep analysis and our longterm approach.

Morningstar's equity research group ("we," "our") believes that a company's intrinsic worth results from the future cash flows it can generate. The Morningstar Rating for stocks identifies stocks trading at a discount or premium to their intrinsic worth—or fair value estimate, in Morningstar terminology. Five-star stocks sell for the biggest risk adjusted discount to their fair values, whereas 1-star stocks trade at premiums to their intrinsic worth.

Four key components drive the Morningstar rating: (1) our assessment of the firm's economic moat, (2) our estimate of the stock's fair value, (3) our uncertainty around that fair value estimate and (4) the current market price. This process ultimately culminates in our singlepoint star rating.

1. Economic Moat

The concept of an economic moat plays a vital role not only in our qualitative assessment of a firm's long-term investment potential, but also in the actual calculation of our fair value estimates. An economic moat is a structural feature that allows a firm to sustain excess profits over a long period of time. We define economic profits as returns on invested capital (or ROIC) over and above our estimate of a firm's cost of capital, or weighted average cost of capital (or WACC). Without a moat, profits are more susceptible to competition. We have identified five sources of economic moats: intangible assets, switching costs, network effect, cost advantage, and efficient scale.

Companies with a narrow moat are those we believe are more likely than not to achieve normalized excess returns for at least the next 10 years. Wide-moat companies are those in which we have very high confidence that excess returns will remain for 10 years, with excess returns more likely than not to remain for at least 20 years. The longer a firm generates economic profits, the higher its intrinsic value. We believe low-quality, no-moat companies will see their normalized returns gravitate toward the firm's cost of capital more quickly than companies with moats.

When considering a company's moat, we also assess whether there is a substantial threat of value destruction, stemming from risks related to ESG, industry disruption, financial health, or other idiosyncratic issues. In this context, a risk is considered potentially value destructive if its occurrence would eliminate a firm's economic profit on a cumulative or midcycle basis. If we deem the probability of occurrence sufficiently high, we would not characterize the company as possessing an economic moat.

2. Estimated Fair Value

Combining our analysts' financial forecasts with the firm's economic moat helps us assess how long returns on invested capital are likely to exceed the firm's cost of capital. Returns of firms with a wide economic moat rating are assumed to fade to the perpetuity period over a longer period of time than the returns of narrow-moat firms, and both will fade slower than no-moat firms, increasing our estimate of their intrinsic value.

Our model is divided into three distinct stages:

Stage I: Explicit Forecast

In this stage, which can last five to 10 years, analysts make full financial statement forecasts, including items such as revenue, profit margins, tax rates, changes in workingcapital accounts, and capital spending. Based on these projections, we calculate earnings before interest, after taxes (EBI) and the net new investment (NNI) to derive our annual free cash flow forecast.

Stage II: Fade

The second stage of our model is the period it will take the company's return on new invested capital—the return on capital of the next dollar invested ("RONIC")—to decline (or rise) to its cost of capital. During the Stage II period, we use a formula to approximate cash flows in lieu of explicitly modeling the income statement, balance sheet, and cash flow statement as we do in Stage I. The length of the second stage depends on the strength of the company's economic moat. We forecast this period to last anywhere from one year (for companies with no economic moat) to 10–15 years or more (for wide-moat companies). During this period, cash flows are forecast using four assumptions: an average growth rate for EBI over the period, a normalized investment rate, average return on new invested capital (RONIC), and the number of years until perpetuity, when excess returns cease. The investment rate and return on new invested capital decline until a perpetuity value is calculated. In the case of firms that do not earn their cost of capital, we assume marginal ROICs rise to the firm's cost of capital (usually attributable to less reinvestment), and we may truncate the second stage.

Stage III: Perpetuity

Once a company's marginal ROIC hits its cost of capital, we calculate a continuing value, using a standard perpetuity formula. At perpetuity, we assume that any growth or decline or investment in the business neither creates nor destroys value and that any new investment provides a return in line with estimated WACC.

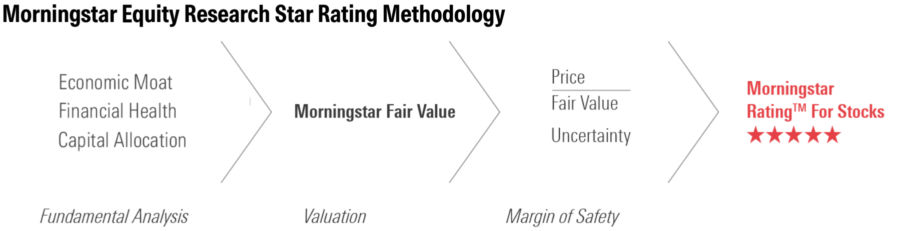
Because a dollar earned today is worth more than a dollar earned tomorrow, we discount our projections of cash flows in stages I, II, and III to arrive at a total present value of expected future cash flows. Because we are modeling free cash flow to the firm—representing cash available to provide a return to all capital providers—we discount future cash flows using the WACC, which is a weighted average of the costs of equity, debt, and preferred stock (and any other funding sources), using expected future proportionate long-term, market-value weights.

3. Uncertainty Around That Fair Value Estimate

Morningstar's Uncertainty Rating is designed to capture the range of potential outcomes for a company's intrinsic value. This rating is used to assign the margin of safety required before investing, which in turn explicitly drives our stock star rating system. The Uncertainty Rating is aimed at identifying the confidence we should have in assigning a fair value estimate for a given stock.

Our Uncertainty Rating is meant to take into account anything that can increase the potential dispersion of future

Morningstar Equity Research Star Rating Methodology



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outcomes for the intrinsic value of a company, and anything that can affect our ability to accurately predict these outcomes. The rating begins with a suggested rating produced by a quantitative process based on the trailing 12-month standard deviation of daily stock returns. An analyst overlay is then applied, with analysts using the suggested rating, historical rating data, and their own knowledge of the company to inform them as they make the final Uncertainty Rating decision. Ultimately, the rating decision rests with the analyst. Analysts take into account many characteristics when making their final decision, including cyclical factors, operational and financial factors such as leverage, company-specific events, ESG risks, and anything else that might increase the potential dispersion of future outcomes and our ability to estimate those outcomes.

Our recommended margin of safety—the discount to fair value demanded before we'd recommend buying or selling the stock—widens as our uncertainty of the estimated value of the equity increases. The more uncertain we are about the potential dispersion of outcomes, the greater the discount we require relative to our estimate of the value of the firm before we would recommend the purchase of the shares. In addition, the Uncertainty Rating provides guidance in portfolio construction based on risk tolerance.

Our Uncertainty Ratings are: Low, Medium, High, Very High, and Extreme.

	Margin of Safety	
Qualitative Analysis Uncertainty Ratings	★★★★★Rating	★Rating
Low	20% Discount	25% Premium
Medium	30% Discount	35% Premium
High	40% Discount	55% Premium
Very High	50% Discount	75% Premium
Extreme	75% Discount	300% Premium

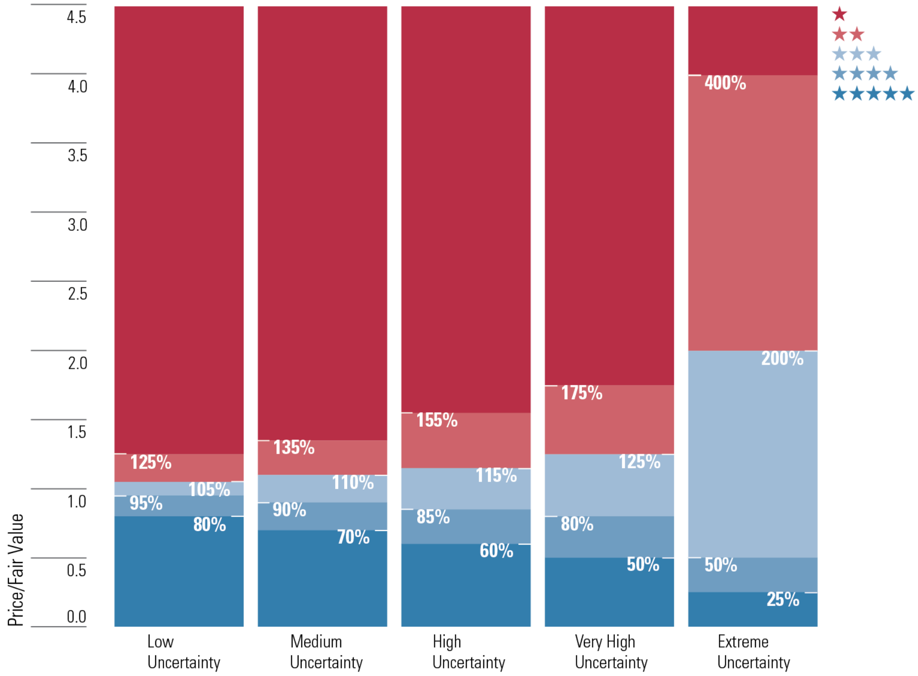
Our uncertainty rating is based on the interquartile range, or the middle 50% of potential outcomes, covering the 25th percentile–75th percentile. This means that when a stock hits 5 stars, we expect there is a 75% chance that the intrinsic value of that stock lies above the current market price. Similarly, when a stock hits 1 star, we expect there is a 75% chance that the intrinsic value of that stock lies below the current market price.

4. Market Price

The market prices used in this analysis and noted in the report come from exchange on which the stock is listed which we believe is a reliable source.

For more details about our methodology, please go to https://shareholders.morningstar.com

Morningstar Equity Research Star Rating Methodology



Morningstar Star Rating for Stocks

Once we determine the fair value estimate of a stock, we compare it with the stock's current market price on a daily basis, and the star rating is automatically re-calculated at the market close on every day the market on which the stock is listed is open. Our analysts keep close tabs on the companies they follow, and, based on thorough and ongoing analysis, raise or lower their fair value estimates as warranted.

Please note, there is no predefined distribution of stars. That is, the percentage of stocks that earn 5 stars can fluctuate daily, so the star ratings, in the aggregate, can serve as a gauge of the broader market's valuation. When there are many 5-star stocks, the stock market as a whole is more undervalued, in our opinion, than when very few companies garner our highest rating.

We expect that if our base-case assumptions are true the market price will converge on our fair value estimate over time generally within three years (although it is impossible to predict the exact time frame in which market prices may adjust).

Our star ratings are guideposts to a broad audience and individuals must consider their own specific investment goals, risk tolerance, tax situation, time horizon, income needs, and complete investment portfolio, among other factors.

The Morningstar Star Ratings for stocks are defined below:

★★★★★ We believe appreciation beyond a fair risk adjusted return is highly likely over a multiyear time frame. Scenario analysis developed by our analysts indicates that the current market price represents an excessively pessimistic outlook, limiting downside risk and maximizing upside potential.

★★★★ We believe appreciation beyond a fair risk-adjusted return is likely.

★★★ Indicates our belief that investors are likely to receive a fair risk-adjusted return (approximately cost of equity).

★★ We believe investors are likely to receive a less than fair risk-adjusted return.

★ Indicates a high probability of undesirable risk-adjusted returns from the current market price over a multi-year time frame, based on our analysis. Scenario analysis by our analysts indicates that the market is pricing in an excessively optimistic outlook, limiting upside potential and leaving the investor exposed to Capital loss.

Other Definitions

Last Price: Price of the stock as of the close of the market of the last trading day before date of the report.

Capital Allocation Rating: Our Capital Allocation (or Stewardship) Rating represents our assessment of the quality of management's capital allocation, with particular emphasis on the firm's balance sheet, investments,

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and shareholder distributions. Analysts consider companies' investment strategy and valuation, balance sheet management, and dividend and share buyback policies. Corporate governance factors are only considered if they are likely to materially impact shareholder value, though either the balance sheet, investment, or shareholder distributions. Analysts assign one of three ratings: "Exemplary", "Standard", or "Poor". Analysts judge Capital Allocation from an equity holder's perspective. Ratings are determined on a forward looking and absolute basis. The Standard rating is most common as most managers will exhibit neither exceptionally strong nor poor capital allocation.

Capital Allocation (or Stewardship) analysis published prior to Dec. 9, 2020, was determined using a different process. Beyond investment strategy, financial leverage, and dividend and share buyback policies, analysts also considered execution, compensation, related party transactions, and accounting practices in the rating.

Capital Allocation Rating: Our Capital Allocation (or Stewardship) Rating represents our assessment of the quality of management's capital allocation, with particular emphasis on the firm's balance sheet, investments, and shareholder distributions. Analysts consider companies' investment strategy and valuation, balance sheet management, and dividend and share buyback policies. Corporate governance factors are only considered if they are likely to materially impact shareholder value, though either the balance sheet, investment, or shareholder distributions. Analysts assign one of three ratings: "Exemplary", "Standard", or "Poor". Analysts judge Capital Allocation from an equity holder's perspective. Ratings are determined on a forward looking and absolute basis. The Standard rating is most common as most managers will exhibit neither exceptionally strong nor poor capital allocation.

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Sustainalytics ESG Risk Rating Assessment: The ESG Risk Rating Assessment is provided by Sustainalytics; a Morningstar company.

Sustainalytics' ESG Risk Ratings measure the degree to which company's economic value at risk is driven by environment, social and governance (ESG) factors.

Sustainalytics analyzes over 1,300 data points to assess a company's exposure to and management of ESG risks. In other words, ESG Risk Ratings measures a company's unmanaged ESG Risks represented as a quantitative score. Unmanaged Risk is measured on an open-ended scale starting at zero (no risk) with lower scores representing less unmanaged risk and, for 95% of cases, the unmanaged ESG Risk score is below 50.

Based on their quantitative scores, companies are grouped into one of five Risk Categories (negligible, low, medium, high, severe). These risk categories are absolute, meaning that a 'high risk' assessment reflects a comparable degree of unmanaged ESG risk across all subindustries covered.

The ESG Risk Rating Assessment is a visual representation of Sustainalytics ESG Risk Categories on a 1 to 5 scale. Companies with Negligible Risk = 5 Globes, Low Risk = 4, Medium Risk = 3 Globes, High Risk = 2 Globes, Severe Risk = 1 Globe. For more information, please visit sustainalytics.com/esg-ratings/

Ratings should not be used as the sole basis in evaluating a company or security. Ratings involve unknown risks and uncertainties which may cause our expectations not to occur or to differ significantly from what was expected and should not be considered an offer or solicitation to buy or sell a security.

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